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DESCRIPTION AND IMPLEMENTATION OF THE HAZARDOUS
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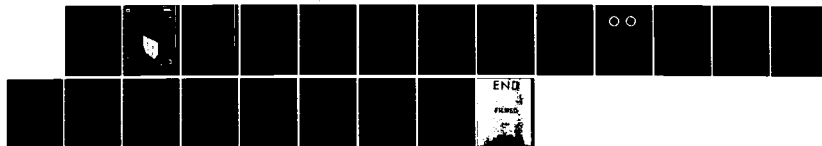
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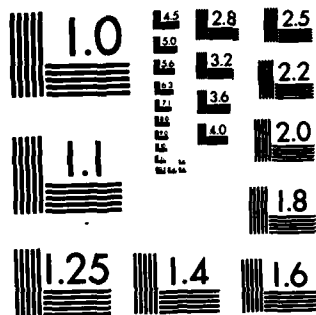
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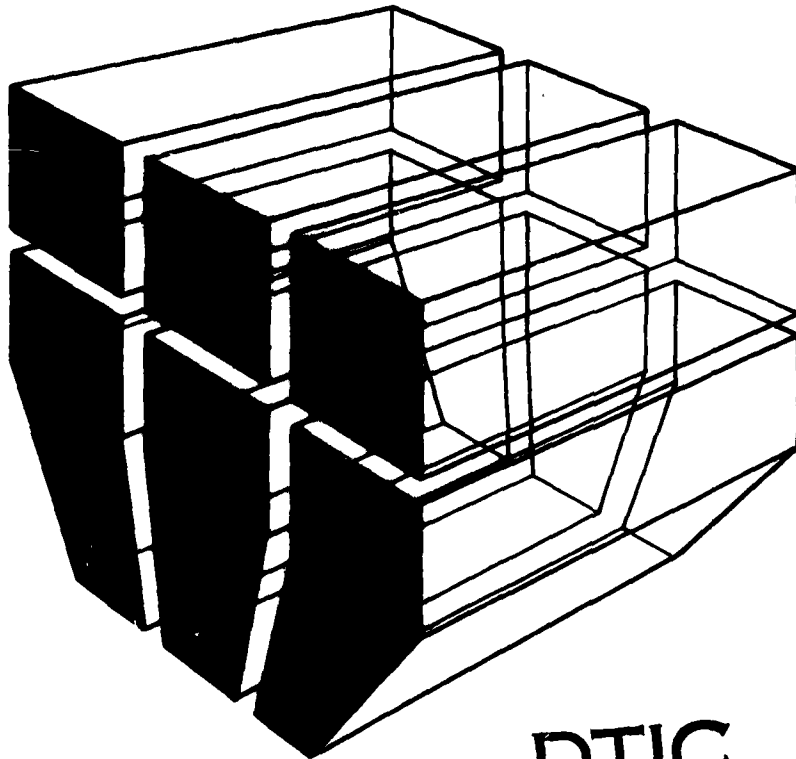
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**TECHNICAL REPORT N-180
June 1984**

(12)

**DESCRIPTION AND IMPLEMENTATION OF THE
HAZARDOUS MATERIALS TRACKING SYSTEM (TRACKER)**

by
**Manette M. Messenger
William R. Nicholls
Ronald D. Webster**



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→ computerized tracking system that interfaces the Army installation procurement system with a database of known hazardous items to produce a monthly listing of the types and amounts of hazardous materials procured by each unit on post. This listing can be used to comply with the requirements of RCRA and the CWA as implemented by Army Regulations 200-1 and 420-47. ↑

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FOREWORD

This research was performed for the Assistant Chief of Engineers (ACE) under Project 4A762720A896, "Environmental Quality for Construction and Operation of Military Facilities"; Task A, "Installation Environmental Management Strategy"; Work Unit 034, "Hazardous Materials Management System."

The work was performed by the Environmental Division (EN) of the U.S. Army Construction Engineering Research Laboratory (CERL), with assistance of the Environmental Office and Automation Management Office at Fort Devens, MA. Ms. Marcia Read, DAEN-ZCF-U, was the Technical Monitor. Dr. R. K. Jain is Chief of CERL-EN.

COL Paul J. Theuer is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.

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DESCRIPTION AND IMPLEMENTATION OF THE HAZARDOUS MATERIALS TRACKING SYSTEM (TRACKER)

1 INTRODUCTION

Background

The proper handling, use, and disposal of hazardous materials is becoming a matter of increasing public concern as the consequences of past mishandling become more threatening and cleanups more costly. As a result, many Federal regulations have been passed that are designed to protect human health and the environment from unwarranted exposure to toxic chemicals. Three of the Acts under which such regulations have been promulgated are the Resource Conservation and Recovery Act of 1976 (RCRA), the Clean Water Act (CWA), and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). These laws and regulations have been implemented for the Army by AR 200-1, *Environmental Protection and Enhancement*, and AR 420-47, *Solid Waste Management*.¹ AR 200-1 requires that each installation develop a list of the types and volumes of hazardous wastes generated on post, and that this list be updated each year. It further requires that each installation develop a spill prevention, control, and countermeasure (SPCC) plan pinpointing the locations of all hazardous materials on post.

Army installations are typically involved in a large number of diverse autonomous activities that procure, use, and dispose of many hazardous materials. Thus, it is a major task to physically survey all of a post's various tenant organizations to obtain the hazardous materials information required by the regulations. An easier method would be to perform a computerized search of the post's procurement records to identify what hazardous materials are being brought on post, and which tenants/activities are procuring them.

In 1982, the need for developing a hazardous wastes procurement tracking system was discussed with representatives from DA, the Major Army

Commands (MACOMs), and the installations. The consensus was that development of such a system be given very high priority. Consequently, existing tracking systems were studied and requirements for an Army tracking system were defined.² Tracking systems under development at Fort Devens, MA and Fort Lewis, WA were obtained, and the Fort Devens system was selected for deployment to other installations. This system, called TRACKER, was modified to run at large installations after being tested at Fort Benning, GA during November 1982. Since then, TRACKER has been implemented at eight other posts. TRACKER is a subsystem of the Hazardous Materials Management System (HMMS) a computerized system designed to help Army fixed facilities identify chemical substances subject to RCRA and AR 200-1 requirements and to provide handling information on those substances.³ TRACKER lists the types and volumes of hazardous materials issued to each unit on post during the past month, by interfacing the post procurement records with a database of known hazardous materials.

Purpose

The purpose of this report is to describe the TRACKER system, its output, and how to implement it.

Approach

The TRACKER system and the type of report it produces are described, and procedures for implementing the system at Army installations are outlined.

Mode of Technology Transfer

It is recommended that TRACKER be implemented as a Class 5 (local unique) system at interested installations in accordance with the provisions of the AR 18-1, *Army Automation Management*. Approval mechanisms have been set up at Headquarters, Training and Doctrine Command (HQ TRADOC) and are being coordinated with Headquarters, Forces Command (HQ FORSCOM).

²M. Messenger, et al., *Tracking Hazardous Materials through Army Installations: A Feasibility Study*, Technical Report N-149/ADA129103 (CERL, 1983).

³M. Messenger, et al., *Preliminary Instructions to the Hazardous Materials Management System (HMMS)*, Draft Technical Report (U.S. Army Construction Engineering Research Laboratory [CERL]).

¹*Environmental Protection and Enhancement*, Army Regulation (AR) 200-1 (Department of the Army [DA], 15 June 1982); *Solid Waste Management*, AR 420-47 (DA, 9 June 1977).

2 DESCRIPTION OF SYSTEM

TRACKER is a stand-alone system that operates on Army installation hardware. It compares national stock numbers (NSNs) in procurement records to those contained in a database of known hazardous materials. When a matching stock number is found, the name and address of the unit that ordered it, the number ordered, container size, date of issue, and requisition number are output. Chemical characteristics and handling recommendations are output from the database of hazardous materials. Figure 1 describes the tracking system process. Appendix A provides the logic diagrams from the computer operations manual.

The procurement system used at Army installations is the Standard Army Intermediate Level Supply System (SAILS). It creates and maintains in its document history file a running record of each requisition as it moves through the supply cycle. SAILS requires that all material ordered through it be identified by a national or a local stock number; however, there is no nomenclature to identify the item being procured.

The tracking system operates by first running the SAILS document history file through a scanning program that strips off requisitions for stock numbers which start with a federal supply group (FSG) that may contain hazardous materials. The FSGs which TRACKER strips off can easily be changed to reflect local needs; recommended FSGs are 13, 42, 61, 62, 65, 67, 68, 79, 80, 81, 83, 84, 85, 87, 91, and 93. Appendix B describes these groups along with their associated federal supply classes (FSCs).

The SAILS document history file is updated daily. A particular requisition remains in the file as long as the order is open, or a minimum of 30 days. Therefore, TRACKER should be run on a monthly basis to ensure that all requisitions passing through SAILS are examined. Orders that remain in the document history file longer than 30 days will be repeated in the TRACKER report for the following month.

The working file produced by the tape scan contains information on open orders for any material in the indicated FSGs. This file is further pared down to contain only orders with code indicating they have

been issued or received by the unit placing the order. The file is then sorted into stock number order and compared with the database of known hazardous materials, which is also sorted by stock number.

The hazardous materials database is created by extracting relevant information from the Hazardous Materials Information System⁴ (HMIS) databases, which have been under development by the Defense Logistics Agency since 1978. The HMIS data is obtained from material safety data sheets provided by the manufacturer of each product. The database has been designed to include a variety of information on each product: identifiers, formulation, chemical/physical properties, fire and explosion hazards, health effects, handling and storage recommendations, spill response, waste disposal, and transportation requirements.

HMIS is the largest available source of this type of data that contains NSNs as identifiers. However, due to an unwieldy data collection process, the HMIS databases do not contain a data sheet for each NSN that represents a hazardous material.⁵ Because of the inadequacy of the HMIS databases, the tracking system does not yet have a complete list of the relevant NSNs to match against the procurement data.

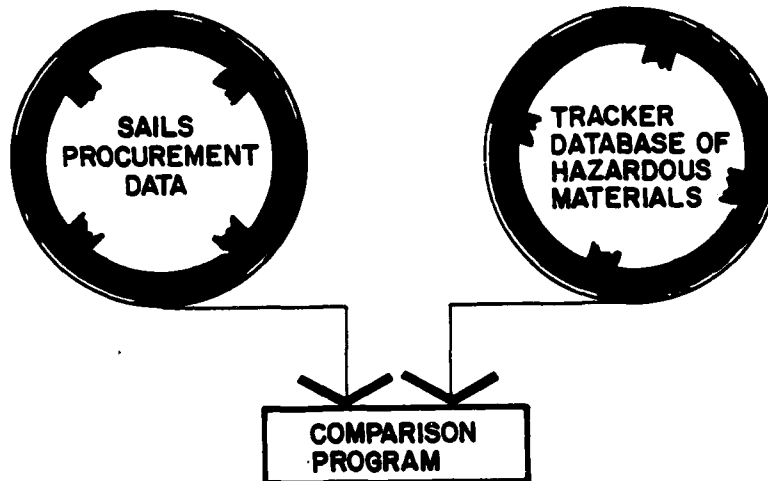
3 DESCRIPTION OF OUTPUT REPORT

Figure 2 is an example page of the report produced by TRACKER. The identifiers in the left column include the NSN, trade name, chemical name, generic name, chemical family and formula, military specification, storage compatibility group, and formulation from the HMIS databases. The chemical name and EPA hazardous waste number, if relevant, are included from an Army Environmental Hygiene Agency (AEHA) database of hazardous wastes. The center and right columns contain handling recommendations from the HMIS databases, when available. Flash point, lower explosive limit, fire hazards, waste elimination, handling and storage precautions, and the DOT name, class, and label

⁴DOD Hazardous Materials Information System Procedures, DOD 6050.5-M (Department of Defense, May 1979).

⁵M. Messenger, et al., *Interactive HMIS: Description and Assessment*, Technical Report N-170/A138329 (CERL, 1983).

HAZARDOUS MATERIALS TRACKING SYSTEM



Tracker Report *Chemical Information*

- NSN
- Trade & chemical names, specs
- Formulation
- Flash point & explosive limit
- Dot name, class, and label
- Handling and storage precautions
- RCA hazardous waste number

User Information

- Name and address of requisitioner
- Quantity received
- Date of issue
- Requisition number

Figure 1. Hazardous materials tracking system process.

required for transport are included. These data may or may not be complete, depending on what is found in HMIS. Information on the units that have ordered the material runs across the entire bottom of the page. In addition, the requisition number, quantity ordered, date of issue, and name and address of unit appear for each order. Orders placed by remote reserve units attached to the active installation will also be included.

The environmental office can use the report in a number of ways, including identification of incoming hazardous materials that might end up as hazardous wastes. For example, solvents ordered by a motor pool unit are typically used for cleaning and degreasing of engine parts. Since many solvents have a flash point below 140°F (60°C), they meet the hazardous waste ignitability criterion, and the spent solvent must be handled properly.

Materials that should not be ordered or used by particular units can also be identified. Some examples from previous TRACKER reports include 75 percent chlordane ordered by the self-service supply store for general use; DDT ordered by the entomology operation (DDT application is no longer allowed in the United States); and paint with high lead concentrations which is subject to restricted-use regulations that had been ordered by an engineer brigade.

The TRACKER report can also be used to identify less hazardous substitutes. For example, room deodorants containing paradichlorobenzene can be replaced with a product containing a much less toxic quaternary ammonium compound. PD-680 Type I, a solvent used for degreasing and dry cleaning that has a flash point of about 100°F (37°C), can be replaced with PD-680 Type II, which flashes at 142°F (61°C). Type II spent solvent does not have to be handled as a hazardous waste, and can be mixed with spent oil since it is a petroleum-based solvent.

Finally, the report is very useful in drawing up the installation spill plan, which requires pinpointing all locations where hazardous materials are used or stored. This allows proper training of all personnel involved in the use of hazardous materials, and contingency planning for response to unexpected releases of hazardous materials into the environment.

The TRACKER report cannot yet provide an exhaustive listing of all hazardous materials enter-

ing a post. The report is only as complete as the database of known hazardous materials, which currently contains about 10,000 NSNs. The U.S. Army Construction Engineering Research Laboratory (CERL) is now developing a complete database for TRACKER, using a supply system data files as a starting point. The scheduled completion date is August 1984; at that time, a taped copy of the complete database will be shipped to all installations that have already implemented TRACKER.

The TRACKER report cannot provide information on local procurement of materials. Although local requisitions go through SAILS, the items ordered are identified with local stock numbers (LSNs). LSNs must contain the correct federal supply class; however, the remaining nine digits are assigned randomly and never reused, although the same item may be re-ordered. To address this problem, TRACKER could be modified to output a report identifying all the LSNs that indicate a federal supply class which contains hazardous materials along with the quantity ordered, and the name and address of the requisitioner. However, final identification of the material would involve calling or writing to the ordering activity directly.

Another drawback is that some activities may not send their requisitions through SAILS. For example, the medical activity (MEDAC) has its own procurement system that handles hospital and laboratory supplies. Generally, the hazardous materials ordered by MEDAC are small volumes and tend to be consumed; the small quantities that must be disposed of are incinerated or discharged in diluted form to the sanitary sewer.

At some installations, the Facility Engineer Supply System (FESS) handles the engineering procurement. At division-level posts, the division as a whole orders through SAILS, but keeps track of individual unit procurements with its own computer system called DS4. Interface of TRACKER with FESS and/or DS4 is technically feasible.

4 IMPLEMENTATION PROCEDURES

CERL will provide TRACKER source and object decks, job control language, taped database, and a computer operations manual to any installation requesting them. Implementation of TRACKER at an installation requires the cooperation of

several different activities. Most important is the Automation Management Office (AMO), which operates the post computers. The AMO will be asked to load and run TRACKER on one of its machines. However, approval must first be obtained to run TRACKER as a Class 5 (local unique) system from the appropriate MACOM. The request for approval must come through the AMO to the MACOM. The system characteristics and descriptive information that the AMO will need to obtain approval are contained in the draft request for approval shown in Appendix C. A briefing has already been given to HQ TRADOC and FORSCOM; both MACOMs have indicated that Class 5 would be approved for installations that apply for it.

Coordination with Directorate of Industrial Operations (DIO), the proponent of the SAILS system, and Deputy Chief of Staff for Logistics (DCSLOG), the manager of the SAILS system, should also be undertaken. Since TRACKER accesses some of the SAILS data, it is important that the proponent and manager of SAILS be briefed about TRACKER operation. Specifically, they must be assured that TRACKER will not change the document history file in any way, and that SAILS inquiry programs need not be used. DCSLOG at both TRADOC and FORSCOM have been briefed to ensure their awareness of TRACKER.

Finally, the operation of the system, the job control language, the tape files that must be mounted, and control of the output report must be described in detail to AMO personnel assigned to run the system. A computer operations manual written for

an early version of the system is available from CERL. Upon written request of the installation environmental office, CERL will coordinate with the appropriate agencies and implement the system through AMO. TRACKER has been successfully run at 10 installations on IBM 4331s and 360s under the DOS-E operating system. Upon request, CERL will attempt to extend TRACKER to other machines and operating systems.

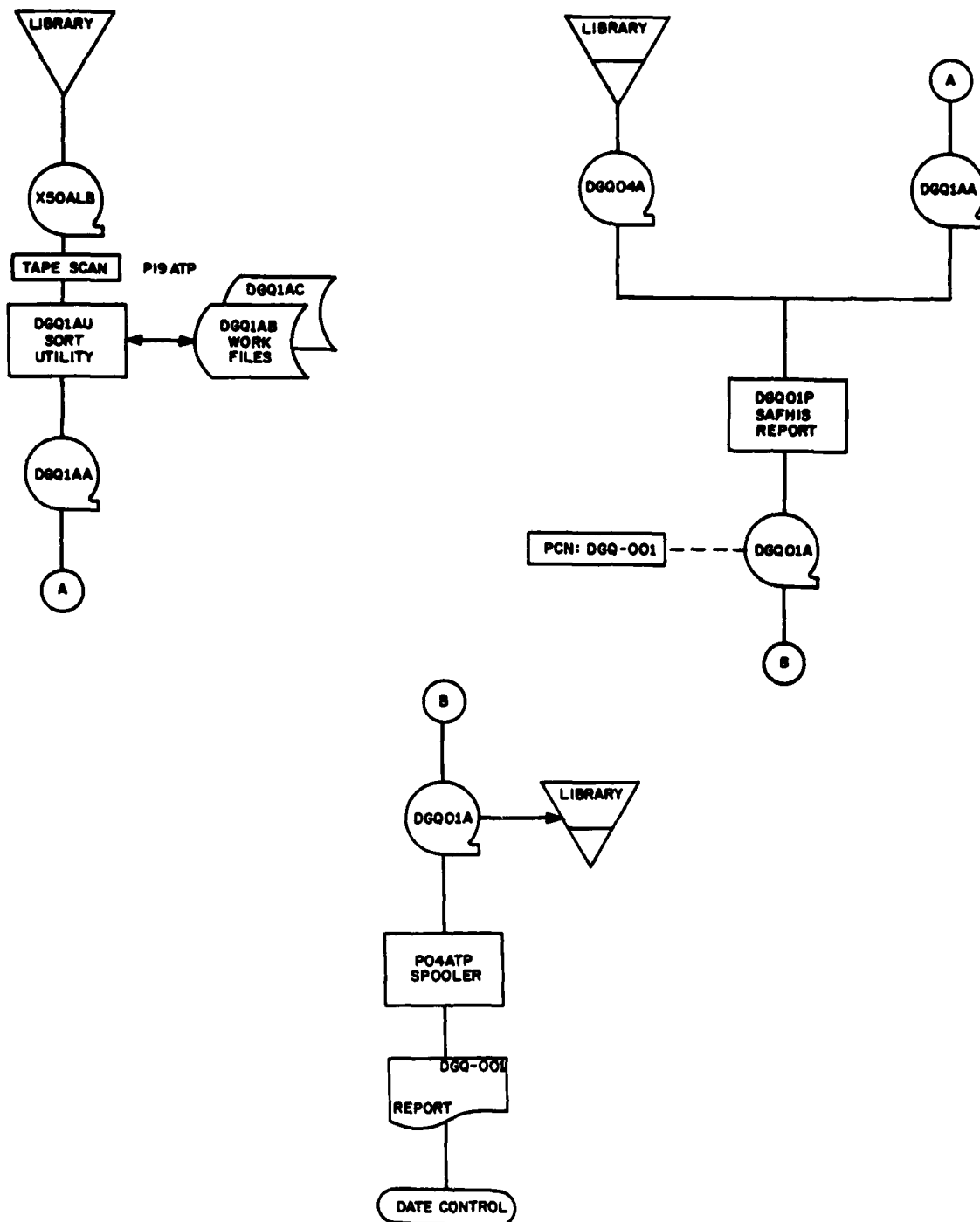
5 CONCLUSIONS AND RECOMMENDATIONS

TRACKER is a useful tool which identifies the types and volumes of hazardous materials issued to each unit on post during the past month by interfacing the post procurement records with a database of known hazardous materials. TRACKER can be implemented at most TRADOC and FORSCOM installations that run SAILS on an IBM 4331 or 360 with operating system DOS-E. The following actions are recommended:

1. Continued technology transfer of TRACKER to other interested installations and modification of the software for use on other machines and operating systems common at Army posts.

2. Continued development of the TRACKER database to contain a complete listing of all NSNs that represent hazardous materials. The database will be created from existing supply databases rather than from the HMIS datafiles.

APPENDIX A: TRACKER LOGIC DIAGRAM



APPENDIX B:

FEDERAL SUPPLY GROUPS AND CLASSES RECOMMENDED FOR TRACKING

FEDERAL SUPPLY CLASSES (first four numbers of NSN)

13 Ammunition and Explosives

- 1305 ammunition, through 30 mm
- 1310 ammunition, 30-75 mm
- 1315 ammunition, 75-125 mm
- 1320 ammunition, over 125 mm
- 1325 bombs
- 1330 grenades
- 1336 guided missile warheads and explosive components
- 1337 guided missile and space vehicle explosive propulsion units, solid fuel, and components
- 1338 guided missile and space vehicle inert propulsion units, solid fuel, and components
- 1340 rockets, rocket ammunition, and rocket components
- 1345 land mines
- 1350 underwater mine inert components
- 1351 underwater mine explosive components
- 1355 torpedo inert components
- 1356 torpedo explosive components
- 1360 depth charges inert components
- 1361 depth charges explosive components
- 1365 military chemical agents
- 1370 pyrotechnics
- 1375 demolition materials
- 1376 bulk explosives
- 1377 cartridge and propellant activated devices and components
- 1385 surface use explosive ordnance disposal tools and equipment
- 1386 underwater use explosive ordnance disposal and swimmer weapons systems, tools, and equipment
- 1390 fuses and primers

- 1395 miscellaneous ammunition
- 1398 specialized ammunition handling and servicing equipment

42 Fire Fighting, Rescue, and Safety Equipment

- 4210 fire fighting equipment
- * 4220 marine lifesaving and diving equipment
- * 4230 decontaminating and impregnating equipment
- 4240 safety and rescue equipment

59 Electric and Electronic Equipment Components

- 5905 resistors
- * 5910 capacitors
- 5915 filters and networks
- 5920 fuses and lightning arrestors
- 5925 circuit breakers
- 5930 switches
- 5935 connectors, electrical
- 5940 lugs, terminals, and terminal strips
- 5945 relays and solenoids
- * 5950 cells and transformers
- 5955 oscillators and crystals
- 5960 electron tubes
- 5961 semiconductors
- 5962 microcircuits
- 5963 electronic modules

61 Electric Wire and Power and Distribution Equipment

- 6105 electrical motors
- 6110 electrical control equipment
- 6115 generators and generator sets, electrical
- * 6116 fuel cell power units, components, and accessories
- * 6120 transformers, distribution and power station
- 6125 converters, electrical rotating
- 6130 converters, electrical nonrotating
- * 6135 batteries, nonrechargeable
- * 6140 batteries, rechargeable
- 6145 wire and cable, electrical
- 6150 miscellaneous electric power and distribution equipment

62 Lighting Fixtures and Lamps

- 6210 indoor and outdoor electric lighting fixtures
- 6220 electric vehicular lights and fixtures
- 6230 electric portable and hand lighting equipment
- 6240 electric lamps
- 6250 ballasts, lampholders, and starters
- * 6260 nonelectrical lighting fixtures

65 Medical, Dental, and Veterinary Equipment and Supplies

- * 6505 drugs, biologicals, and official reagents
- * 6508 medicated cosmetics and toiletries
- 6510 surgical dressing materials
- 6515 medical and surgical instruments, equipment, and supplies
- 6520 dental instruments, equipment, and supplies
- * 6525 x-ray equipment, including film developers
- 6530 hospital furniture, equipment, utensils, and supplies
- 6532 hospital and surgical clothing
- 6540 ophthalmologic instruments, equipment, and supplies
- * 6545 medical sets, kits, and outfits

67 Photographic Equipment

- 6710 cameras, motion picture
- 6720 cameras, still picture
- 6730 photographic projection equipment
- 6740 developing and finishing equipment
- * 6750 photographic supplies
- 6760 photographic equipment and accessories
- 6770 film, processed
- * 6780 photographic sets, kits, and outfits

68 Chemicals and Chemical Products

- * 6810 chemicals
- * 6820 dyes
- * 6830 gases, compressed and liquefied
- * 6840 pest control agents and disinfectants
- * 6850 miscellaneous chemical specialties

79 Cleaning Equipment and Supplies

- 7910 floor polishers and vacuum cleaners
- 7920 brooms, brushes, mops, and sponges

- * 7930 cleaning and polishing compounds and preparations

80 Brushes, Paints, Sealers, and Adhesives

- * 8010 paints, dopes, varnishes, and related products
- 8020 paint brushes
- * 8030 preservative and sealing compounds
- * 8040 adhesives

81 Containers, Packaging, and Packing Supplies

- 8105 bags and sacks
- 8110 drums and cans
- 8115 boxes, crates, and cartons
- 8120 commercial and industrial gas cylinders, empty
- 8125 bottles and jars
- 8130 reels and spools
- 8135 packaging and packing bulk materials, excluding adhesives
- 8140 ammunition and nuclear ordnance boxes, packages, and special containers
- 8145 special shipping and storage containers

83 Textiles, Leather, Furs, Tents, and Flags

- 8305 textile fabrics
- 8310 yarn and thread
- 8315 notions and apparel bindings
- 8320 padding and stuffing material
- 8325 fur materials
- 8330 leather
- 8335 shoe bindings and soling materials
- 8340 tents and tarpaulins
- 8345 flags and pennants

85 Toiletries

- * 8510 perfumes, toilet preparations, and powders
- * 8520 toilet soaps, shaving preparations, and dentrifices
- 8530 personal toiletry articles
- 8540 toiletry paper products

87 Agricultural Supplies

- 8710 forage and feed
- * 8720 fertilizers
- 8730 seeds and nursery stock

91 Fuels, Lubricants, Oils, and Waxes

- * 9110 fuels, solid
- * 9130 liquid propellants and fuels, petroleum base
- * 9135 liquid propellant fuels and oxidizers, chemical base
- * 9140 fuel oils
- * 9150 oils and greases, cutting, lubricating, and hydraulic
- * 9160 miscellaneous waxes, oils, and fats

93 Nonmetallic Fabricated Materials

- 9310 paper and paperboard
- 9320 rubber fabricated materials
- 9330 plastic fabricated materials
- 9340 glass fabricated materials
- * 9350 refractories and fire surfacing materials
- * 9390 miscellaneous (includes asbestos)

*If tracking is done by FSC rather than FSG, the starred classes are recommended for inclusion.

APPENDIX C:

DRAFT REQUEST FOR APPROVAL TO OBTAIN AND OPERATE CLASS 5 SYSTEM

a. System Title: Hazardous Materials Tracking System

b. Proponent Agency: Installation DEH

c. Assigned Responsible Agency: Installation AMO

d. DPI: Installation

e. System Description: The Hazardous Materials Tracking System is a class 5 system originally developed at Fort Devens, MA, to identify the procurement of hazardous materials by units on post. The system scans the SAILS document history file to strip out materials in federal supply groups that have been chosen by the installation environmental officer. The result is compared to a database of known hazardous materials by national stock number. Matching records are output to a report that shows the location and quantity of the material on the installation.

Source code, JCL, documentation, and the database of hazardous materials will be provided by

CERL and maintained by installation AMO. The database of hazardous materials is still under development at CERL; updated versions will be provided by CERL as they become available.

f. Reason for System Use: The purpose of system is to provide the DEH environmental office with a method to identify and control hazardous materials that are being used at the installation. Use of the system will eliminate the manual process of matching hazardous material stock numbers against SAILS listings to identify and locate hazardous materials on post. It will provide current information on a monthly basis.

The information is required for effective management of two environmental programs:

1. Spill Prevention and Control/Spill Contingency Planning required under the Clean Water Act (Federal) PL 95-217. The Environmental Office must locate and keep a record of facilities which have a potential for releasing "hazardous substances" in "reportable quantities" into the environment.

2. Hazardous Waste Management required under the Federal Resource Conservation and Recovery Act—Subtitle C—PL 94-580. These statutes mandate specific packaging, labeling, storage, treatment, manifesting, and disposal procedures.

g. Output Description: One report is produced containing the national stock number of the hazardous material, the units on post that have ordered it, and the quantity issued or received during the past month.

h. Resource Requirements: Operation of the system will require about 6 to 10 minutes of processing time once a month and 1 hour of runtime once a month. The software is written in COBOL and can be operated on either an IBM 360 or 4331 running DOS-E. The output report will be 200 to 300 pages on two-part paper. Maintenance of the system will involve changing the federal supply groups scanned off at the request of the environmental officer.

Files Used:

SAILS, X50ALB, document history file, tape
SAILS, A9LALL, dodaac names and addresses, tape
DGQ04A, database of hazardous materials, tape

The X50ALB is run through a tape scan to identify requisitions for materials in particular federal supply groups. The resulting file is sorted and then matched by stock number against DGQ04A; *matching records are listed, along with various environmental data from DGQ04A and SAILS data showing the location (A9LALL) and quantity (X50ALB) of hazardous materials on post.*

i. Benefits: Use of the system will eliminate the more than 80 hours of manually matching stock numbers that would be required every month to get the same information. The system is a management aid that saves many hours of repetitive research at the Environmental Office.

j. Statement of Impact: DA PAM 18-1-1 was reviewed and no system identified.

Estimated manhours required to operate and maintain the system are 12 hours per year.

k. Security Classification and Privacy Act Applicability: none. The SAILS data accessed are not classified.

l. Data elements are all Army Standard elements from the SAILS system, as follows:

national stock number	SAILS X50ALB
unit of issue (ui)	SAILS X50ALB
quantity (qty)	SAILS X50ALB
DIC code	SAILS X50ALB
dodaac code	SAILS X50ALB
dodaac location	SAILS A9LALL

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